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# FSP235-60GT

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# 1. GENERAL REQUIREMENTS

This specification describes a 235 watts power supply.

With + 5V stand-by and remote ON/OFF control.

# 2. INPUT REQUIREMENTS

The power supply shall operate from 90 to 132 Vrms or 180 to 264 Vrms.

The power supply shall operate from an AC mains frequency of 47 through 63 Hz.

The Ac mains single-cycle peak inrush current shall be limited to 45 amps cold,70 amps cold, 70 amps warm measured at 132 Vrms, 60 Hz and coinciding with the AC main voltage peak.

The AC mains steady-state RMS input current shall be:

7.0 amps maximum / 115 Vrms, 60 Hz.

4.0 amps maximum / 230 Vrms, 50 Hz.

# 3. OUTPUT REQUIREMENTS

## 3.1.OUTPUT VOLTAGE AND CURRENT

| | MINIMUM LOAD | MAXIMUM LOAD | LOAD REG. | CROSS REG. | LINE REG. | RIPPLE & NOISE |
|---|---|---|---|---|---|---|
| *+3.3V | 0.2A | 14.0A | ±4% | ±4% | ±1% | 50mV P-P |
| +5V | 2.0A | 22.0A | ±5% | ±5% | ±1% | 50mV P-P |
| +12V | 0.0A | 8.0A | ±5% | ±5% | ±1% | 120mV P-P |
| -5V | 0.0A | 0.3A | ±5% | ±5% | ±2% | 150mV P-P |
| -12V | 0.0A | 0.8A | ±5% | ±5% | ±2% | 150mV P-P |
| +5Vsb | 0.0A | 0.8A | ±5% | ±5% | ±1% | 50mV P-P |

+3.3V & +5V total output not excel 125 watts.

*OPTIONAL

All outputs shall be safety-isolated from the AC mains and share a common return. This common return must be connected to supply chassis.

Voltages and ripple are measured at the load side of mating connectors with a 0.1 uF monolithic ceramic capacitor paralleled by a 10 uF electrolytic capacitor across the measuring terminals.

**CROSS REQULATION CHARACTERISTICS**

| NO. | LOAD CONDITION | OUTPUT RANGE | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | COND.1 | 14A | 15.0A | 8A | 0.3A | 0.8A | 0.8A |
| 2 | COND.2 | 0.2A | 2A | 0.0A | 0A | 0A | 0A |
| 3 | COND.3 | 0.2A | 22A | 0.2A | 0.3A | 0.8A | 0.8A |
| 4 | COND.4 | 14A | 2A | 8A | 0.3A | 0.8A | 0.8A |
| 5 | COND.5 | 0.2A | 22A | 8/A | 0.3A | 0.8A | 0.8A |
| 6 | COND.6 | 7A | 11A | 4A | 0.15A | 0.8A | 0.8A |
| 7 | COND.7 | 0.2A | 2A | 8A | 0.3A | 0.4A | 0.05A |
| 8 | COND.8 | 14A | 15A | 0.5A | 0.05A | 0.05A | 0A |
| 9 | COND.9 | 0.2A | 2A | 0.0A | 0A | 0A | 0.8A |

### 3.2.REMOTE ON/OFF CONTROL

The power supply shall accept a logic open collector level which will disable / enable all the output voltage (exclude + 5V stand by ).

As logic level is low, outputs voltage were enable.

As logic level is high, outputs voltage were disable.

Note: 1. Logic high level :3.50-5.25V while sourcing 0.4mA maximum.

2. Logic low level : 0-0.5V while sinking 1.5mA maximum.

3. Rise Time : 2ms maximum (10%-90%).

### 3.3.OUTPUT VOLTAGE HOLD-UP TIME

16.6 mS minimum : at 115V / 60 Hz.

20.0 mS minimum : at 230V / 50 Hz.

(Refer to the figure 1.)

### 3.4.OPERATION AT NO LOAD

The power supply shall be capable of being operated with no load on any or all outputs without damage. For no load on +3.3V&+5V, the output shall not exceed +4.5&+6.5Vdc and the power supply may shutdown and required by remote-control or remove AC power restart.

### 3.5.PROTECTION

#### 3.5.1.OVER-VOLTAGE PROTECTION

In the event of an over-voltage condition on +3.3&+5Vdc the power supply shall shutdown and require remote control or remove the AC mains input to reset the system:

+3.3V: 4.5V (maximum)

+5V : 6.5V (maximum)

### 3.5.2. OVER-LOAD PROTECTION

There shall be protection from an output over-current event. The supply may shutdown form such an event and require power-on restart. Testing consists of application of the listed over-current value with maximum load on all other outputs.

Over-current test values: (maximum load)

+3.3V : 50A

+5V : 45A

+12V : 18A

### 3.5.3. SHORT-CURRENT PROTECTION

A short circuit at any output shall cause no damage to the power supply nor blow the primary fuse. The supply may shut down in the event of a short circuit and require power-on restart. A short circuit consists of application of a test resistance of less than 0.05 ohms at each output with maximum load on all outputs.

## 3.6. OUTPUT RESETIME

The cold-start enable output voltage risetime of all outputs shall be measured with maximum load on all outputs.

| | | |
|---|---|---|
| risetime : | +3.3V | 50mS (maximum) |
| (10-90%) | +5V | 50mS (maximum) |
| | +12 V | 50mS (maximum) |
| | -5V | 50mS (maximum) |
| | -12V | 50mS (maximum) |
| | +5Vsb | 50mS (maximum) |

## 3.7. OUTPUT OVERSHOOT

No output voltage shall overshoot or generate spikes at turn-on or turn-off, during momentary power loss, output short, or realistic input voltage or output load changes, Overshoot is defined as any output that exceeds the voltage tolerance plus or minus an additional 5%.

### 3.8.EFFICIENCY

#### 3.8.1.POWER SUPPLY EFFICIENCY

Overall efficiency must be 65% minimum measured at normal AC mains voltage and frequency with maximum loads on all outputs.

#### 3.8.2."ENERGY STAR" EFFICIENCY

With 115VAC input voltage, the maximum output power shall be less than 16W in order to ensure that the input power is less than 30W.

#### 3.8.3.REMOTE-OFF POWER CONSUMPTION

4.0W maximum on AC input 115V, +5Vsb conditions.

### 3.9.POWER GOOD SIGNAL

115V / 230V (FULL LOAD) : 100-500mS

### 3.10.POWER FAIL SIGNAL

115V / 230V (FULL LOAD) : 1mS minimum.

T1 : RISETIME < 50mS
T2 : POWER GOOD DELAY TIME 100mS-500mS
T3 : HOLD-UP TIME > 16.6mS
T4 : POWER FAIL DELAY TIME > 1mS
T5 : TRANSFER TIME T3-T4 > 12mS

## 4. PHYSICAL ENVIRONMENT

### 4.1.OPERATING CONDITIONS

The power supply shall be capable of continuous operation and meet all electrical specification without need for adjustment when subjected to the following environmental conditions:

#### 4.1.1.AMBIENT TEMPERATURE : 0 TO 50°C

#### 4.1.2.RELATIVE HUMIDITY : 90%

### 4.2.STORAGE AND SHIPPING CONDITIONS

No degradation of the power supply shall occur during shipping or storage at the specified conditions.

#### 4.2.1.AMBIENT TEMPERATURE : -20 TO +65

#### 4.2.2.RELATIVE HUMIDITY : 95%

### 4.3.SHOCK AND VIBRATION

The power supply will withstand the following imposed conditions without experiencing non-recoverable failure or deviation form specified output characteristics.

Storage -40G,11mSec. half-sine wave pulse in both directions on three mutually perpendicular axes.

Operating -10G, 11mSec. half-sine wave pulse in both directions on three mutually perpendicular axes.

Vibration Operation-Sine wave excited, 0.25G maximum acceleration. 10-250 Hz, swept at one octave/min. Fifteen minute dwell at all resonant points, where resonance is defined as those exciting

frequencies at which the device under test experiences excursions two times large than non-resonant excursions.

## 5. REGULATORY COMPLIANCE

### 5.1.SAFETY REQUIREMENTS

-CSA C22.2

-UL 1950

-IEC 950

-VDE 0805

-NEMKO (CB REPORT)

### 5.2.DIELECTRIC STRENGTH

Primary to Secondary : 1800 Vac for 1 sec.

Primary to Frame Ground : 1800 Vac for 1 sec.

### 5.3.INSULATION RESISTANCE

Primary to Secondary : 20 Meg. ohms Minimum.
Primary to FRAME GROUND : 20 Meg. ohms Minimum.

### 5.4.GROUND LEAKAGE CURRENT

The power supply ground leakage current shall be less than 3.5mA.

### 5.5.EMISSION REQUIREMENTS

When testing the power supply must operate within the listed requirements.

#### 5.5.1.FCC REQUIREMENTS

Power supply shall comply with the United States Communication commission ( FCC ) Rules and Regulations, part 15, Subpart j,
Computing Devices “Class B limits”.

#### 5.5.2.CE REQUIREMENTS

Power supply shall conform to the “ CISPR 22” requirements.

### 5.6.INPUT LINE CURRENT HARMONIC CONTENT( OPTIONAL )

The power supply meet the requirements of IEC1000-3-2, class D, at full rated power.

## 6. OTHER REQUIREMENTS

### 6.1.COOLING

With the sleeve fan voltage set to around 12 volts, the fan will deliver greater than 28 CF with the power supply in open air.

### 6.2.FANC SIGNAL CONTROL ( OPTIONAL )

The fan speed and shutdown are controlled by motherboard. The motherboard should supply voltage to power supply FC pin from +12VDC to 0VDC. This signal allows the system to request control of the power supply fan from full speed or off.
*1.If power supply inside temperature over 80°C, the fan will at full speed.
*2. If FC pin is left open, the fan will at full speed.

### 6.3.FANM SIGNAL (OPTIONAL)

The FanM signal is an optional fan monitor signal. It is an open collector, 2 pulse per revolution tachometer signal from the power supply fan. The signal stops cycling during a lock rotor state; the level can be either high or low. This signal allows the system to monitor the power supply for fan speed or failures.

### 6.4.ACOUSTIC NOISE LEVEL

The operating acoustic noise level of the power supply shall not exceed the A-Weighted Sound Pressure level (Lpa) of 30 dBA and the A-Weighted Sound Power level (Lwa) of 32 dBA at 25+B238 at 45% RH measured at 25 cm in all planes per ECMA-74 and ECMA-109 (latest revisions) over the fan‘s minimum to maximum static load rating.

### 6.5.INPUT CONNECTIONS

Refer to Mechanical Specifications for placement.
The AC mains input are through a three-circuit IEC type connector mounted on the rear of the power supply chassis.

### 6.6.RELIABILITY

The power supply reliability, when calculated by MIL-HDBK-217; latest revision, are exceed 100.000 hours with all output at maximum load and an ambient temperature of 25°C.